Modeling and Calibration Using DRQAT

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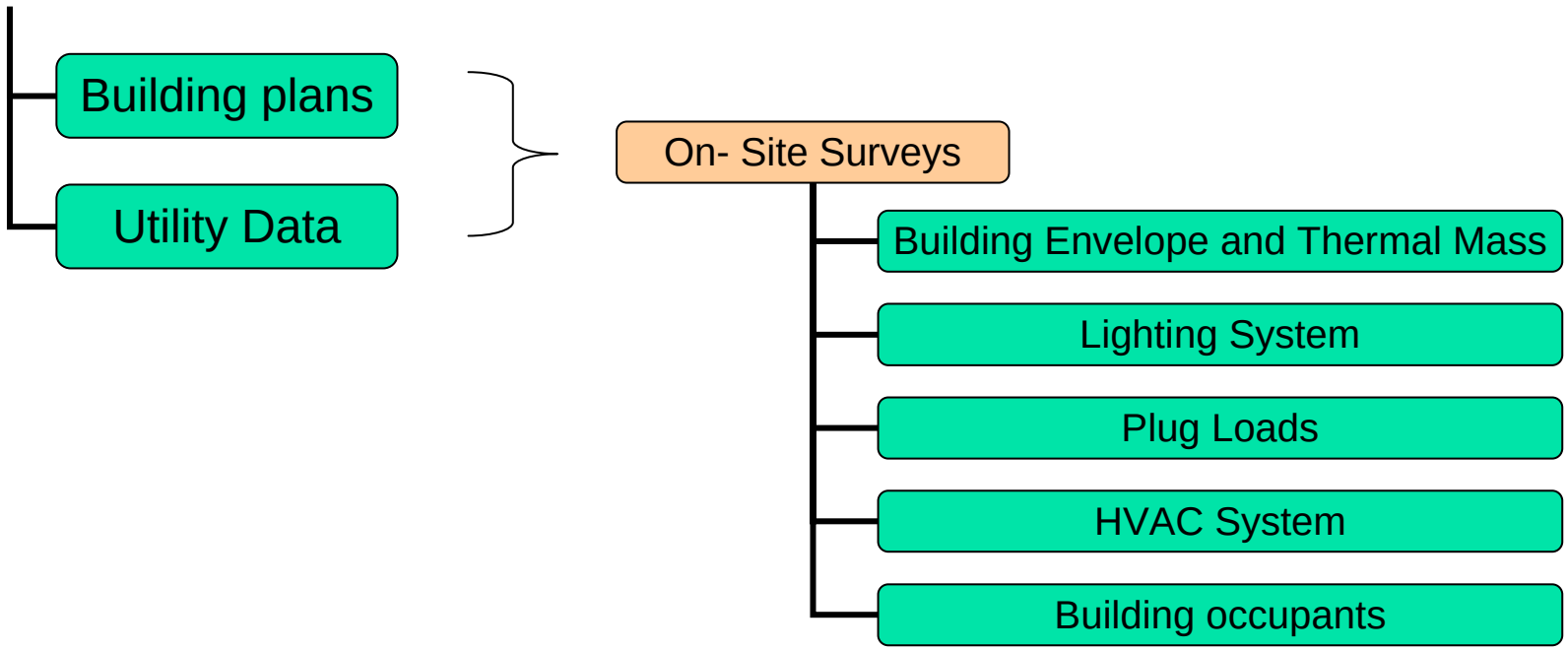
Contra Costa country office building in Martinez

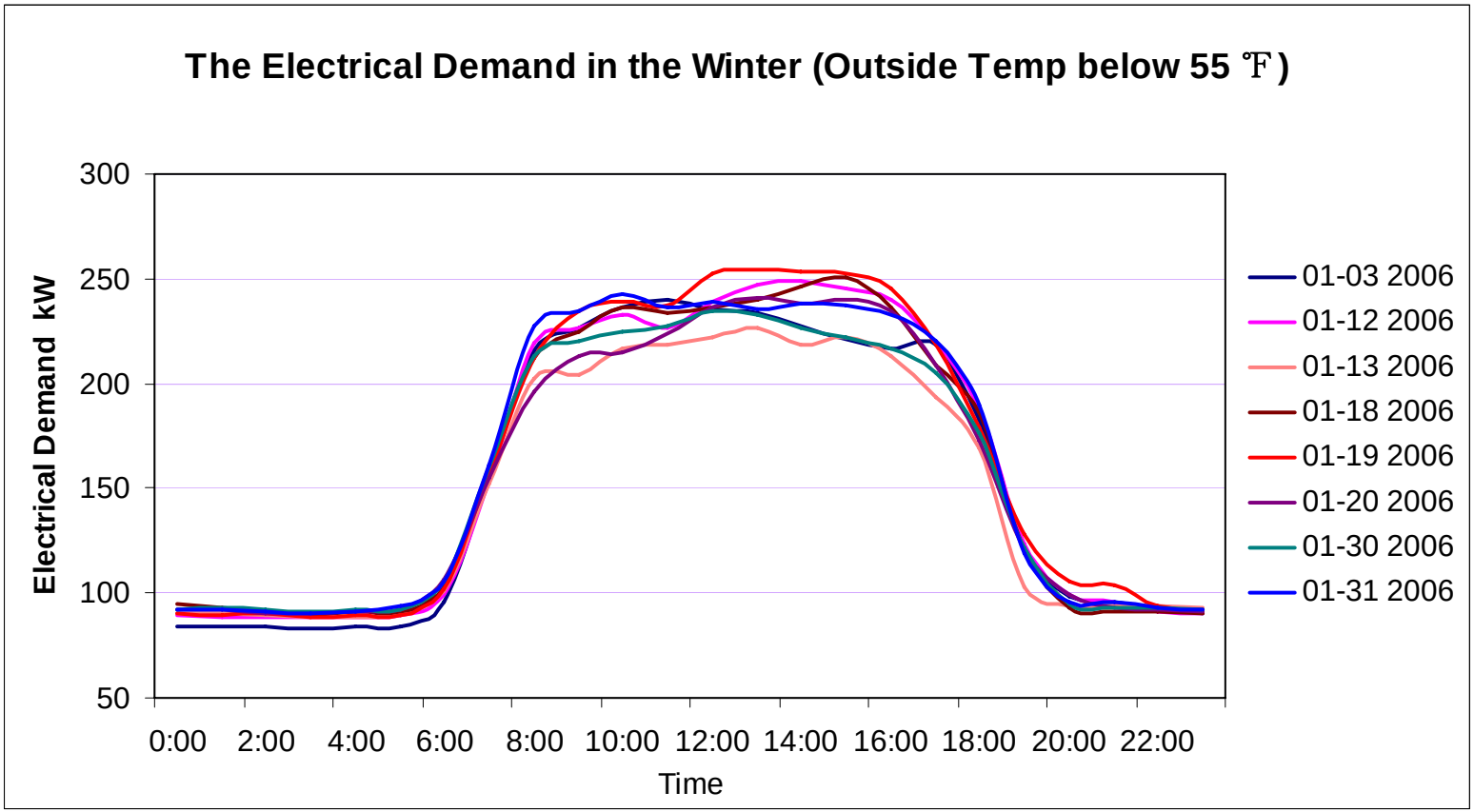
- Apply actual weather into the model, replace the weather file of the DRQAT
- Confirm the lighting & plug schedules, HVAC System Characteristics and operation Schedules

procedure of modeling and calibration

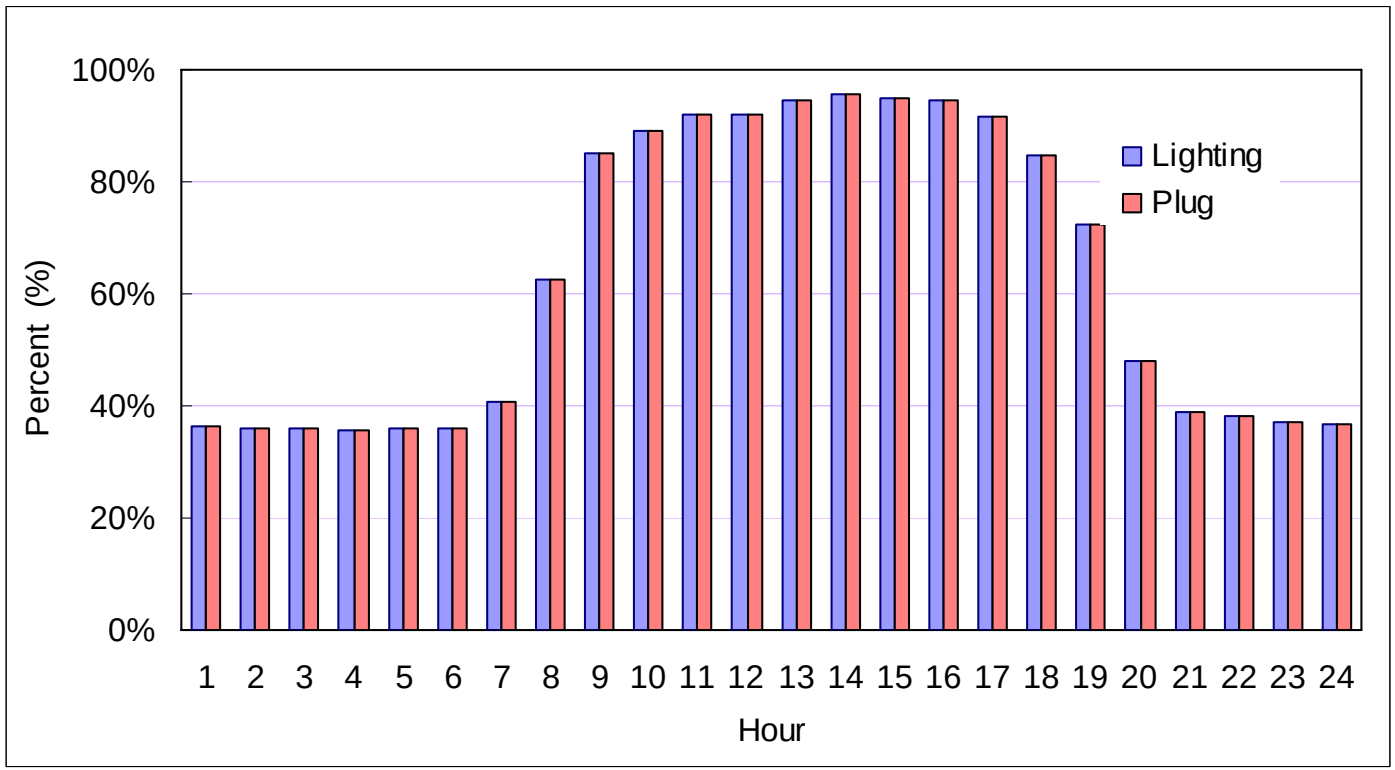
Data Collection → Input data into the model →



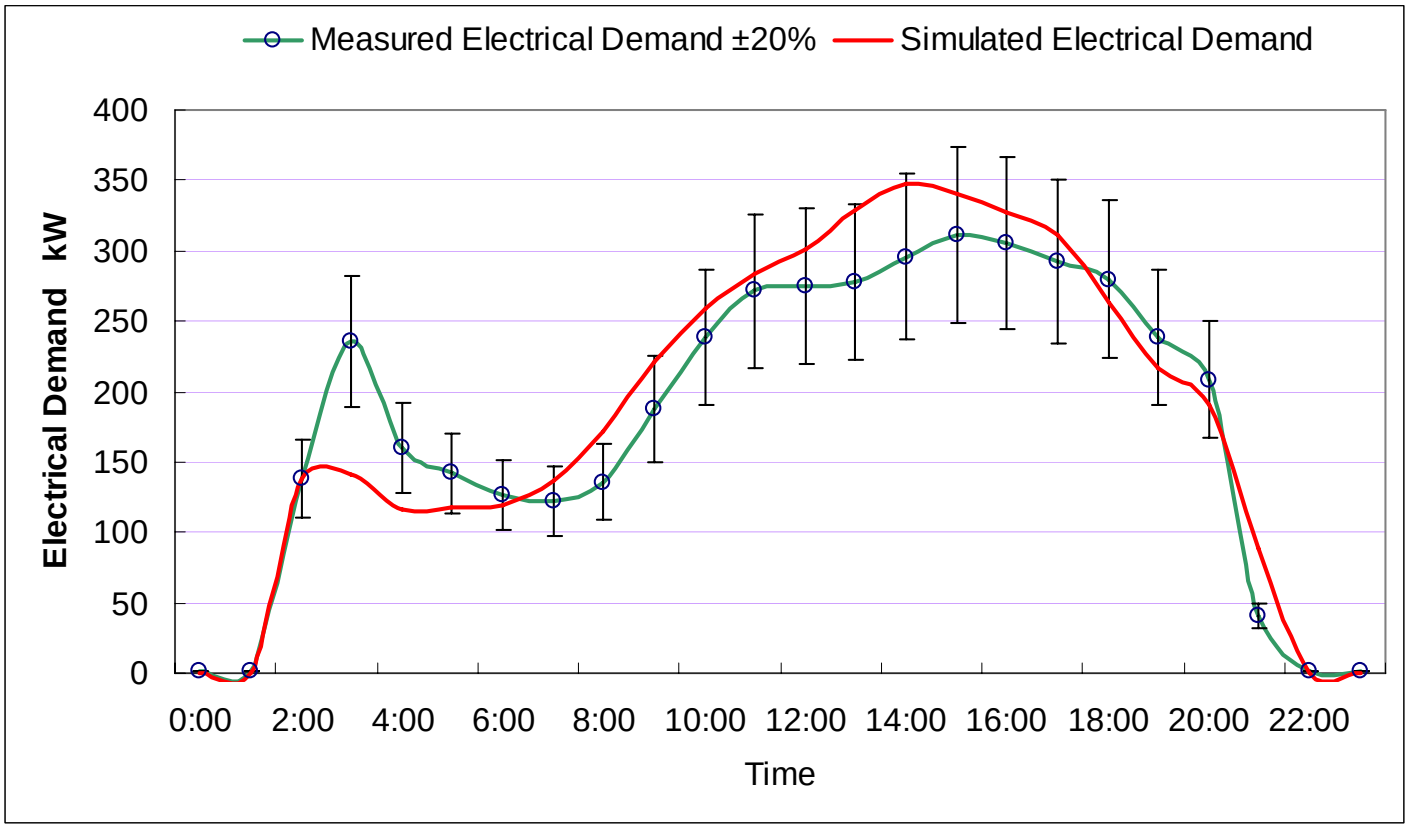
Electrical demand of the whole building in the winter



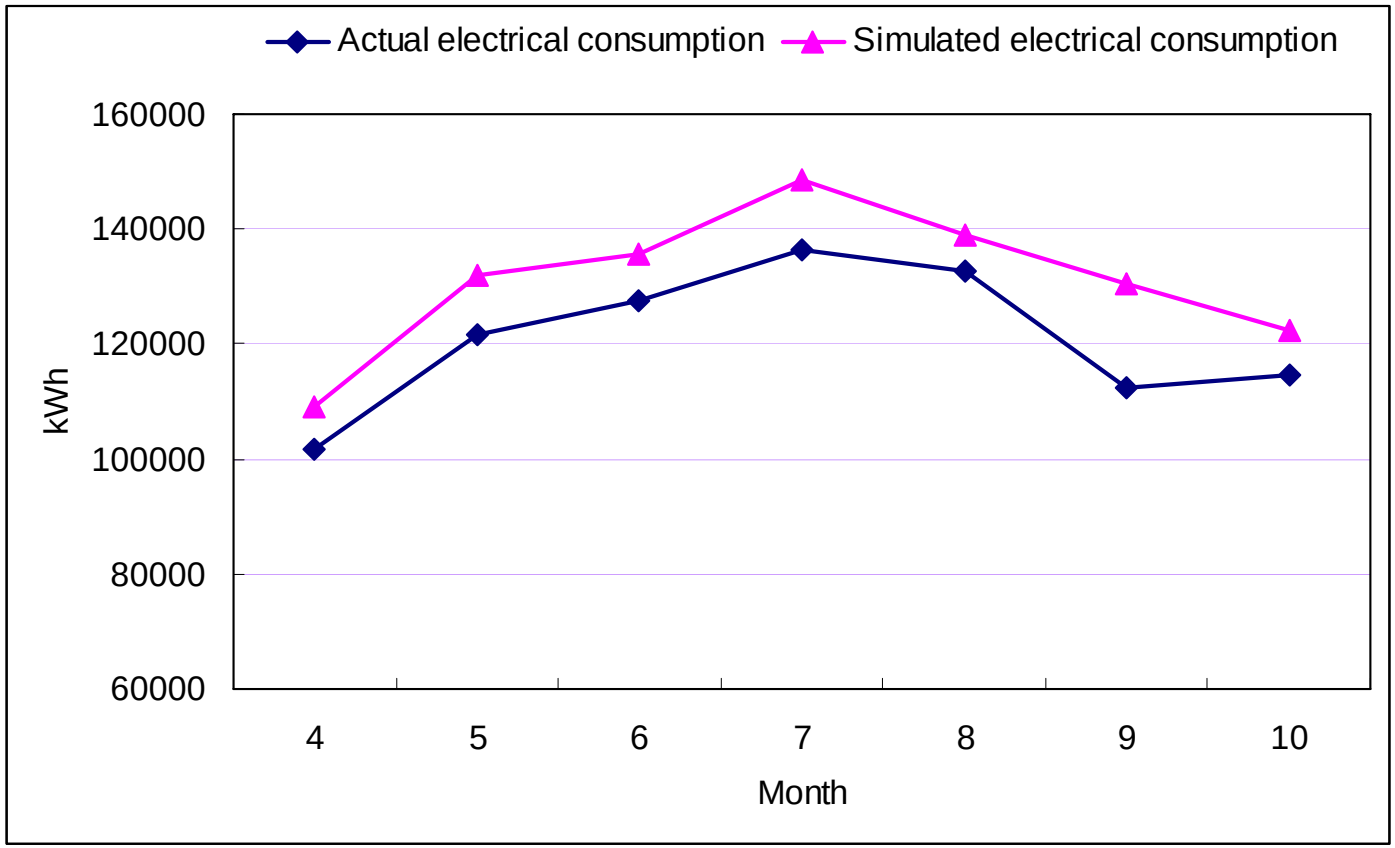
Confirm lighting & plug power densities and schedules



Compare the simulated results to the measured data-First calibration



Compare the simulated results to the measured data-First monthly calibration

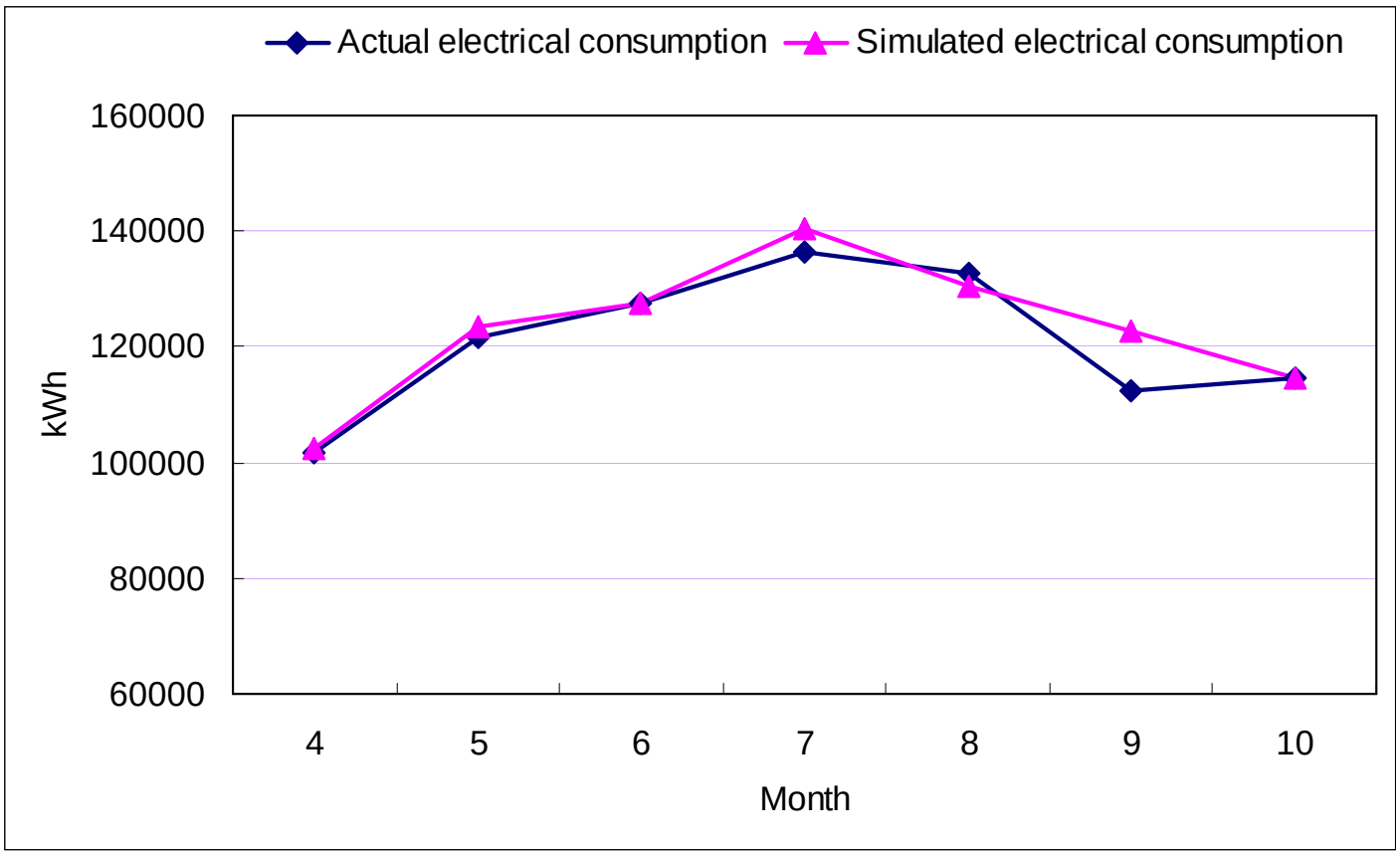


Refine model until an acceptable calibration is Achieved

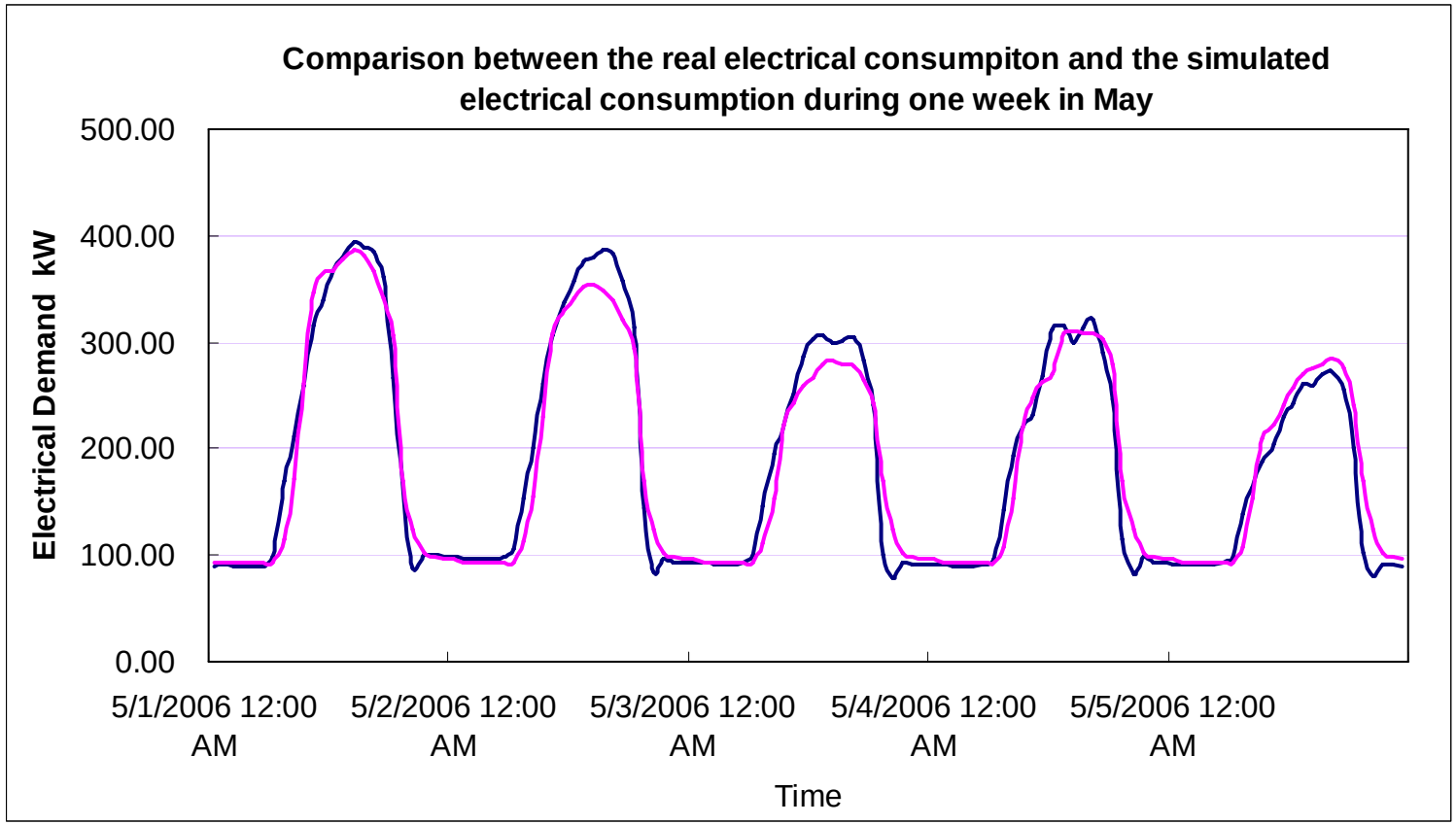
1. Simulation input checks
   - Building information
   - Lighting & plug load power densities, operating schedules
   - Occupant number, operating schedules
   - HVAC system characteristics
   - Plant equipment characteristics

2. Simulation output checks
   - HVAC system satisfy cooling load (zone sizing)

Compare the simulated results to the measured data-Second monthly calibration

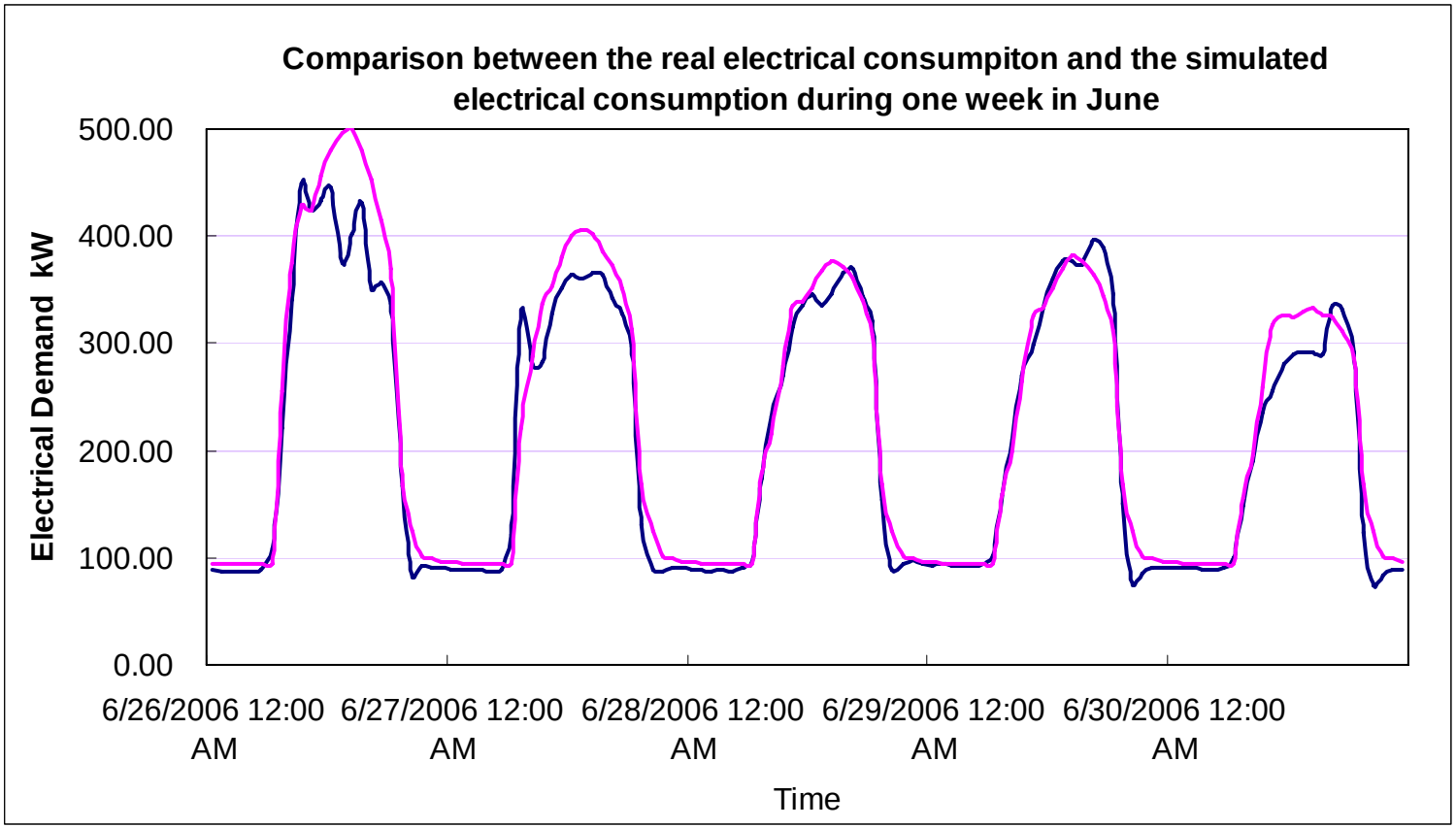


Daily electrical consumption comparison



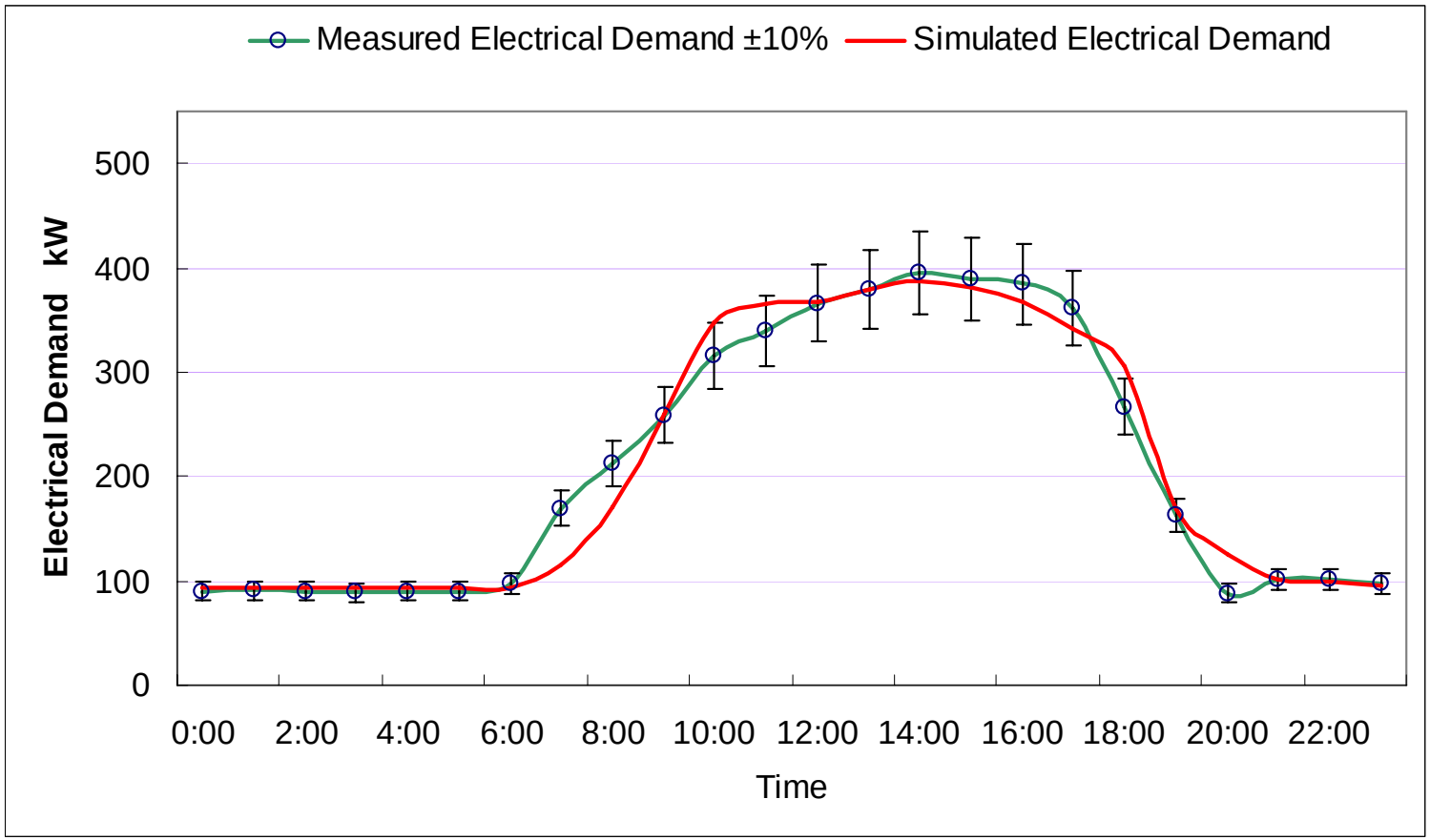
Daily electrical consumption of the simulation model vs. actual electrical consumption in May

Daily electrical consumption comparison

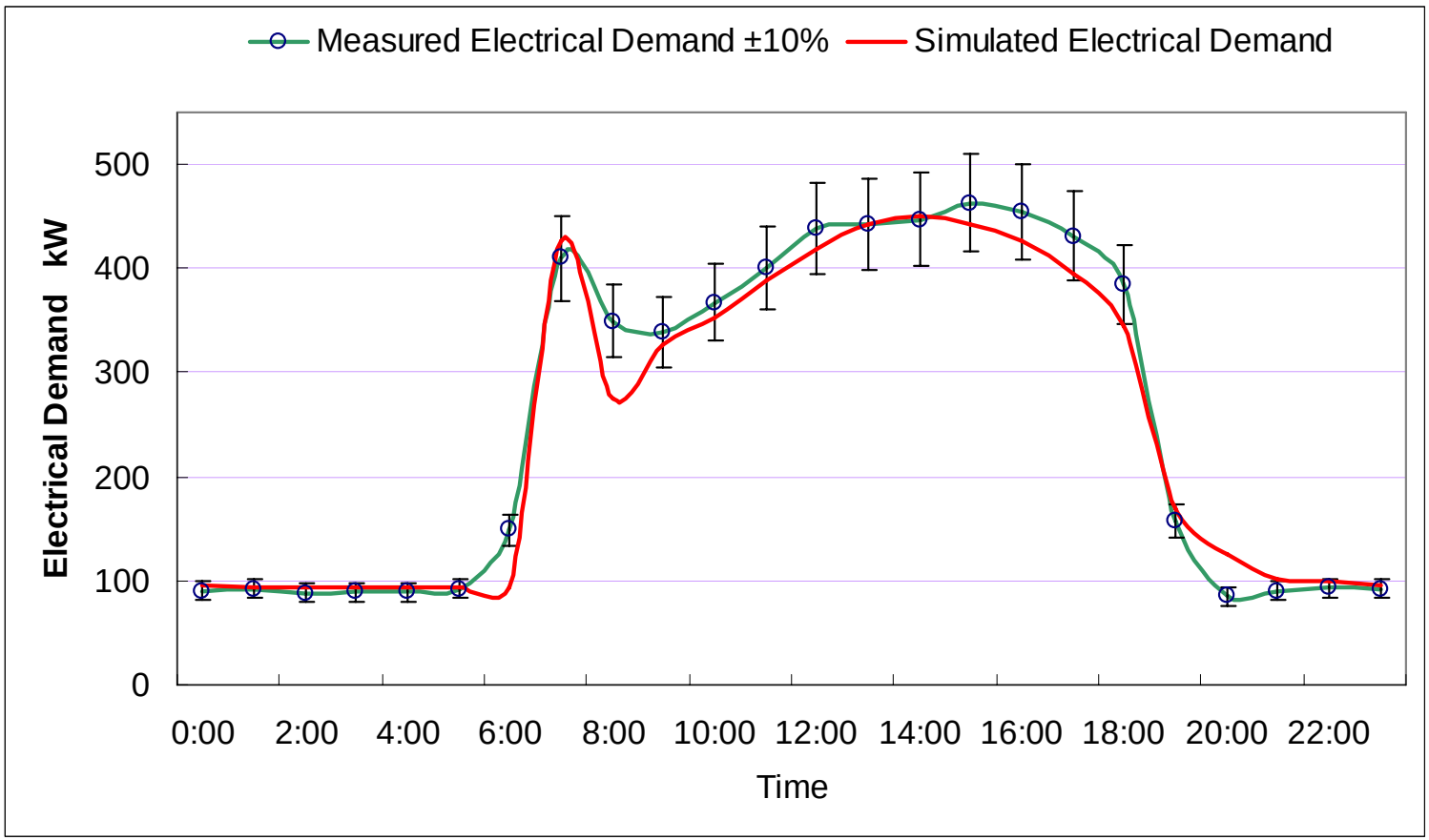


Daily electrical consumption of the simulation model vs. actual electrical consumption in June

Hourly electrical consumption comparison – Cool weather condition



Hourly electrical consumption comparison – Warm weather condition



Cigna Health Call Center in San Bernardino

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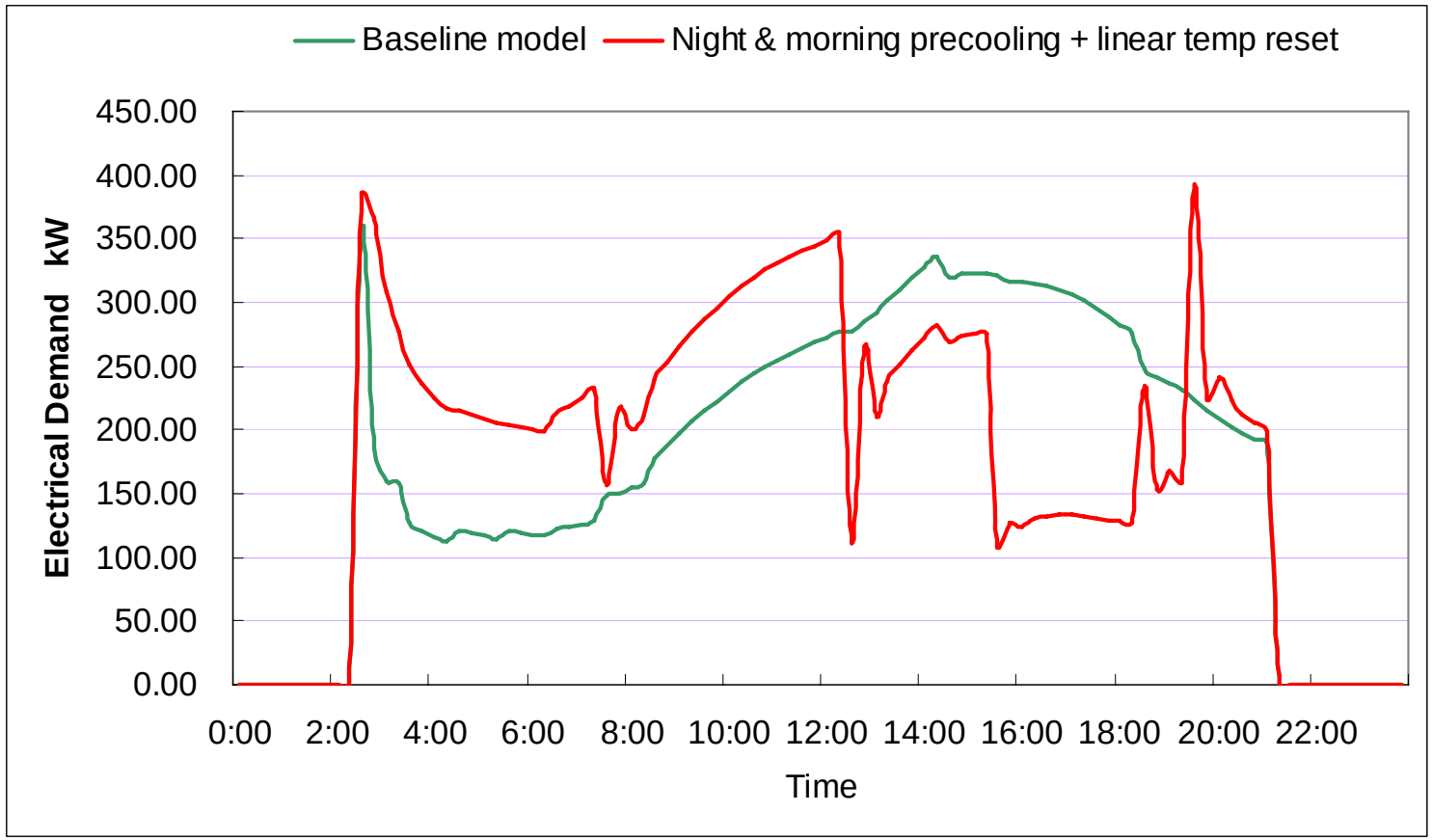
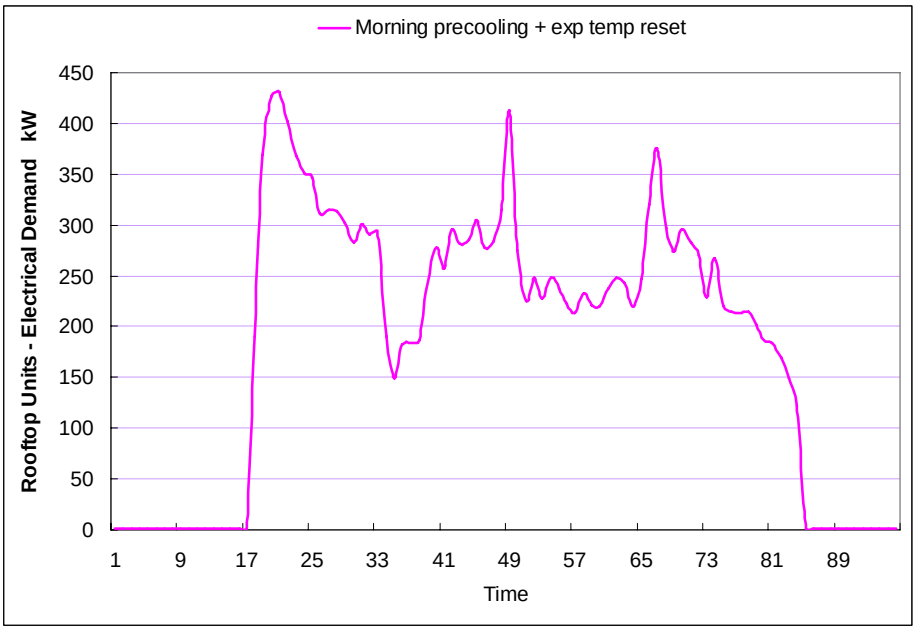
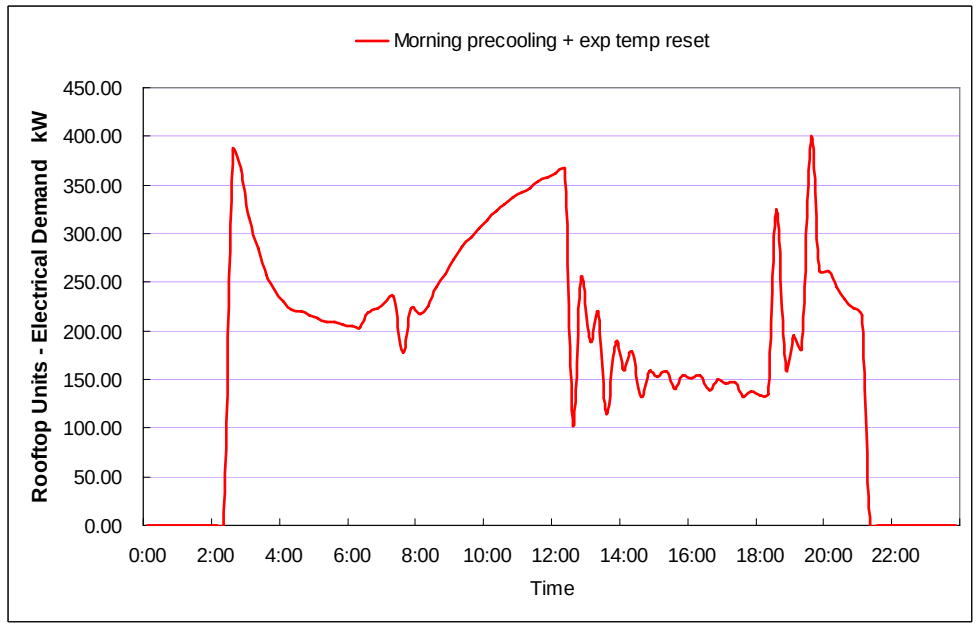
DR-morning pre-cooling + peak two step temp reset



DR-morning pre-cooling + exp temp reset





Actual data

Simulated DR Result

Conclusion

- DRAQT can estimate hourly electricity demand with a reasonable level of accuracy
  - winter interval meter data to estimate the internal load
  - real weather data

Future work

- Develop a standard calibration procedures
- Update EnergyPlus
- Quantify building internal thermal mass
- Add in real time weather file function
- Add in new building models